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FIGURE 1

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FIGURE 2

GGAGAGAGGCGCGCGGGTGAAAGGCGCATTGATGCAGCCTGCGGCGGCCTCGGAGCGCGGGGGGCCAGACGCTG ACCACGTTCCTCCTCGGTCTCCTCCGCCTCCAGCTCCGCGCTGCCCGGCAGCCGGGAGCCATCCGAGCCCAGG GCCCGCCGCCTCCCGCAGCGGCTCCGCGGCCTCCTGCTGCTGCTGCTGCTGCTGCCGCGCGCGCGCGTCGAGCG GCTTACAAGGGCCAGCAGGAGTGCCTGGTCGAGACGGGAGCCCTGGGGCCAATGTTATTCCGGGTACACCTGGGA TCCCAGGTCGGGATGGATTCAAAGGAGAAAAGGGGGGAATGTCTGAGGGAAAGCTTTGAGGAGTCCTGGACACCCA ACTACAAGCAGTGTTCATGGAGTTCATTGAATTATGGCATAGATCTTGGGAAAATTGCGGAGTGTACATTTACAA AAGGAAGCCCTGAAATGAATTCAACAATTAATATTCATCGCACTTCTTCTGTGGAAGGACTTTGTGAAGGAATTG GTGCTGGATTAGTGGATGTTGCTATCTGGGTTGGCACTTGTTCAGATTACCCAAAAGGAGATGCTTCTACTGGAT ${\tt GGAATTCAGTTTCTCGCATCATTATTGAAGAACTACCAAAA} {\tt TAA} {\tt ATGCTTTAATTTTCATTTGCTACCTCTTTTT}$ AAGTGGTTTCAATATTTTTTTTTTTGGTTGGTTAGAATACTTTCTTCATAGTCACATTCTCTCAACCTATAATTTGGA

 $\tt CCCCGCAGCCCTTCTCCTCTTTCTCCCACGTCCTATCTGCCTCTCTCGCTGGAGGCCAGGCCGTGCAGCATCGA$ AGACAGGAGGAACTGGAGCCTCATTGGCCGGCCCGGGGCGCCCTCGGGCTTAAATAGGAGCTCCGGGCTCTG $\tt CCTGGGCAAGGCCTCTGCGCTCTCCTGGCCACTCTCGGCGCCGCCGGCCAGCCTCTTGGGGGAAGTCCAT$ CTGTTCCGCCAGAGCCCCGGCCAAATACAGCATCACCTTCACGGGCAAGTGGAGCCAGACGGCCTTCCCCAAGCA GTACCCCCTGTTCCGCCCCCTGCGCAGTGGTCTTCGCTGCTGGGGGCCGCGCATAGCTCCGACTACAGCATGTG GAGGAAGAACCAGTACGTCAGTAACGGGCTGCGCGACTTTGCGGAGCGCGGGGGCGTGGGCGCTGATGAAGGA CGACTGGTTCGTGGGCGTGGACAGCCTGGACCTGTGCGACCGTTGGCGGGAACAGGCGGCGCTGGACCT GTACCCCTACGACGCCGGGACGGCCTTCACCTTCTCCTCCCCCAACTTCGCCACCATCCCGCAGGACAC GGTGACCGAGATAACGTCCTCCTCTCCCAGCCACCCGGCCAACTCCTTCTACTACCCGCGGCTGAAGGCCCTGCC CAGCAGGGACAATGAGATTGTAGACAGCGCCTCAGTTCCAGAAACGCCGCTGGACTGCGAGGTCTCCCTGTGGTC GTCCTGGGGACTGTGCGGAGGCCACTGTGGGAGGCTCGGGACCAAGAGCAGGACTCGCTACGTCCGGGTCCAGCC CGCCAACAACGGGAGCCCCTGCCCCGAGCTCGAAGAAGAGGGCTGAGTGCGTCCCTGATAACTGCGTC**TAA**GACCA GAGCCCGCAGCCCCTGGGGCCCCCGGAGCCATGGGGTGTCGGGGGGCTCCTGTGCAGGCTCATGCTGCAGGCGG GTCTGCTCTCAGCCTCCTCCTCCTGCAGGATAAAGTCATCCCCAAGGCTCCAGCTACTCTAAATTATGTCTCCTT ATAAGTTATTGCTGCTCCAGGAGATTGTCCTTCATCGTCCAGGGGCCTGGCTCCCACGTGGTTGCAGATACCTCA GACCTGGTGCTCTAGGCTGTGCTGAGCCCACTCTCCCGAGGGGCGCATCCAAGCGGGGGCCACTTGAGAAGTGAAT AAATGGGGCGGTTTCGGAAGCGTCAGTGTTTCCATGTTATGGATCTCTCTGCGTTTGAATAAAGACTATCTCTGT

GAGGAACCTACCGGTACCGGCCGCGCGCTGGTAGTCGCCGGTGTGGCTGCACCTCACCAATCCCGTGCGCCGCG CTGGGCCGTCGGAGAGTGCGTGTGCTTCTCTCCTGCACGCGGTGCTTGGGCTCGGCCAGGCGGGGTCCGCCCA GGGTTTGAGGATGGGGGGTAGCTACAGGAAGCGACCCCGCGATGGCAAGGTATATTTTTGTGGAATGAAAAGGA ${\tt AGTATTAGAAATGAGCTGAAGACCATTCACAGATTAATATTTTTTGGGGACAGATTTGTGATGCTTGATTCACCCT}$ $\tt TGAAGTAATGTAGACAGAAGTTCTCAAATTTGCATATTACATCAACTGGAACCAGCAGTGAATCTTAATGTTCAC$ TTAAATCAGAACTTGCATAAGAAAGAGA<mark>ATG</mark>GGAGTCTGGTTAAATAAAGATGACTATATCAGAGACTTGAAAAG GATCATTCTCTGTTTTCTGATAGTGTATATGGCCATTTTAGTGGGCACAGATCAGGATTTTTACAGTTTACTTGG AGTGTCCAAAACTGCAAGCAGTAGAGAAATAAGACAAGCTTTCAAGAAATTGGCATTGAAGTTACATCCTGATAA TCTACGGAAAAGTATGACAAATATGGAGAAAAGGGACTTGAGGATAATCAAGGTGGCCAGTATGAAAGCTGGAA CTATTATCGTTATGATTTTGGTATTTATGATGATGATCCTGAAATCATAACATTGGAAAGAAGAGAATTTGATGC TGCTGTTAATTCTGGAGAACTGTGGTTTGTAAATTTTTACTCCCCAGGCTGTTCACACTGCCATGATTTAGCTCC CACATGGAGAGACTTTGCTAAAGAAGTGGATGGGTTACTTCGAATTGGAGCTGTTAACTGTGGTGATGATAGAAT GCTTTGCCGAATGAAAGGAGTCAACAGCTATCCCAGTCTCTTCATTTTTCGGTCTGGAATGGCCCCAGTGAAATA TCATGGAGACAGATCAAAGGAGAGTTTAGTGAGTTTTGCAATGCAGCATGTTAGAAGTACAGTGACAGAACTTTG AGGAGGAGATTGTTTGACTTCACAGACACGACTCAGGCTTAGTGGCATGTTGTTTCTCAACTCATTGGATGCTAA AGAAATATTTTGGAAGTAATACATAATCTTCCAGATTTTGAACTACTTTCGGCAAACACACTAGAGGATCGTTT GGCTCATCATCGGTGGCTGTTATTTTTTCATTTTGGAAAAAATGAAAATTCAAATGATCCTGAGCTGAAAAAACT AAAAACTCTACTTAAAAATGATCATATTCAAGTTGGCAGGTTTGACTGTTCCTCTGCACCAGACATCTGTAGTAA TCTGTATGTTTTCAGCCGTCTCTAGCAGTATTTAAAGGACAAGGAACCAAAGAATATGAAATTCATCATGGAAA GAAGATTCTATATGATATACTTGCCTTTGCCAAAGAAAGTGTGAATTCTCATGTTACCACGCTTGGACCTCAAAA TTTTCCTGCCAATGACAAGAACCATGGCTTGTTGATTTCTTTGCCCCCTGGTGTCCACCATGTCGAGCTTTACT ACCAGAGTTACGAAGAGCATCAAATCTTCTTTATGGTCAGCTTAAGTTTGGTACACTAGATTGTACAGTTCATGA GGGACTCTGTAACATGTATAACATTCAGGCTTATCCAACAACAGTGGTATTCAACCAGTCCAACATTCATGAGTA TGAAGGACATCACTCTGCTGAACAAATCTTGGAGTTCATAGAGGATCTTATGAATCCTTCAGTGGTCTCCCTTAC ACCCACCACCTTCAACGAACTAGTTACACAAAGAAAACACAACGAAGTCTGGATGGTTGATTTCTATTCTCCGTG GTGTCATCCTTGCCAAGTCTTAATGCCAGAATGGAAAAGAATGGCCCGGACATTAACTGGACTGATCAACGTGGG CAGTATAGATTGCCAACAGTATCATTCTTTTTGTGCCCAGGAAAACGTTCAAAGATACCCTGAGATAAGATTTTT TCCCCCAAAATCAAATAAAGCTTATCAGTATCACAGTTACAATGGTTGGAATAGGGATGCTTATTCCCTGAGAAT CTGGGGTCTAGGATTTTTACCTCAAGTATCCACAGATCTAACACCTCAGACTTTCAGTGAAAAAGTTCTACAAGG GAAAAATCATTGGGTGATTGATTTCTATGCTCCTTGGTGTGGACCTTGCCAGAATTTTGCTCCAGAATTTGAGCT AGCTGGGATCAGGGCCTATCCAACTGTTAAGTTTTATTTCTACGAAAGAGCAAAGAGAAATTTTCAAGAAGAGCA GATAAATACCAGAGATGCAAAAGCAATCGCTGCCTTAATAAGTGAAAAATTGGAAACTCTCCGAAATCAAGGCAA GAGGAATAAGGATGAACTT**TGA**TAATGTTGAAGATGAAGAAAAAGTTTAAAAGAAATTCTGACAGATGACATCAG GAATTATCTACAGCACTGGTGTAAAAGAAGGGTCTGCAAACTTTTTCTGTAAAGGGCCGGTTTATAAATATTTTA GACTTTGCAGGCTATAATATATGGTTCACACATGAGAACAAGAATAGAGTCATCATGTATTCTTTATTTGCT TTTAACAACCTTTAAAAAATATTAAAACGATTCTTAGCTCAGAGCCATACAAAAGTAGGCTGGATTCAGTCCATG ATCTACATAAATGTCTAAGTTGTATAAAGTCCACTTTCCCTTCACGTTTTTTGGCTGACCTGAAAAGAGGGTAACT TAGTTTTTGGTCACTTGTTCTCCTAAAAATGCTATCCCTAACCATATATTTATATTTCGTTTTAAAAACACCCAT AAATTTGAGCAACAGTAAGTGCACAAATTCTGTAGTTTGCTGTATCATCCAGGAAAACCTGAGGGAAAAAAATTA TAGCAATTAACTGGGCATTGTAGAGTATCCTAAATATGTTATCAAGTATTTAGAGTTCTATATTTTAAAGATATA TGTGTTCATGTATTTTCTGAAATTGCTTTCATAGAAATTTTCCCACTGATAGTTGATTTTTTGAGGCATCTAATAT TTTTTCACTCCTGTCCAGTCTATTTATTATTCAAATAGGAAAAATTACTTTACAGGTTGTTTTACTGTAGCTTAT AATGATACTGTAGTTATTCCAGTTACTAGTTTACTGTCAGAGGGCTGCCTTTTTCAGATAAATATTGACATAATA CTCAAAGAATCACAAATTTGTCAGTAACATGTAGTTGTTTAGTTATAATTCAGAGTGTACAGAATGGTAAAAATT

 ${\tt GGCAAC} \underline{\textbf{ATG}} {\tt GCTCAGCAGGCTTGCCCCAGAGCCATGGCAAAGAATGGACTTGTAATTTGCATCCTGGTGATCACC}$ TTACTCCTGGACCAGACCACCACACATCCAGATTAAAAGCCAGGAAGCACAGCAAACGTCGAGTGAGAGAC AAGGATGGAGATCTGAAGACTCAAATTGAAAAGCTCTGGACAGAAGTCAATGCCTTGAAGGAAATTCAAGCCCTG CAGACAGTCTGTCTCCGAGGCACTAAAGTTCACAAGAAATGCTACCTTGCTTCAGAAGGTTTGAAGCATTTCCAT GAGGCCAATGAAGACTGCATTTCCAAAGGAGGAATCCTGGTTATCCCCAGGAACTCCGACGAAATCAACGCCCTC ${\tt CAAGACTATGGTAAAAGGAGCCTGCCAGGTGTCAATGACTTTTGGCTGGGCATCAATGACATGGTCACGGAAGGC}$ AAGTTTGTTGACGTCAACGGAATCGCTATCTCCTTCCTCAACTGGGACCGTGCACAGCCTAACGGTGGCAAGCGA GAAAACTGTGTCCCGTTCTCCCAATCAGCTCAGGGCAAGTGGAGTGATGAGGCCTGTCGCAGCAGCAAGAGATAC ${\tt ATATGCGAGTTCACCATCCCTAAA} {\color{red}{\textbf{TAG}}} {\color{blue}{\textbf{GTCTTTCTCCAATGTGTCCTCCAAGCAAGATTCATCATAACTTATAGG}}$ TTCATGATCTCTAAGATCAAGTAAAAATCATAATTTTTACTTATTAAAAAATTGCAACAAGATCAATGTCCAT AGCAATATGATAGCATCAGCCAATTTTGCTAACACATTTCTTTGGGATTTTGCCCTTCCTGGGGTATAGGGGGATC AGAAATATTGATCCATGTGCACGCAGATAAAATGGCTTCTGCTAAACAGACTAAAATCTTTCTCTCTAGTCTTTC AGGCTACCTGAAAGATTTTCCCTTGGAAGTTTAGCGTATGTTTGACTAACAAAAATTCCCTACATCAGAGACTCTAGGTGCTATATAATCCAAAAACTTTTCAGCCTGTTGCTCATTCTGTCCCATGCTGGCAATAATACCTTGTCAGCC ${\tt CATTACCCTTATTTTGAATTGCTCCATCTCCTGGTGGGACTTGTATCTTGTCTGCCATATCAGAACACAAACCCC}$ AATGAAATGACAAGGTGTATATTTGATCAATTTTCATTCCCACCATTGCATTACAACCTCTAACTTAAATGGGTA TAGCATCCTTACTCTCACCTTTTATGAGATTGAGAGTGGACTTACATTTCCTTTTTTACATTTTCGTATATTTAT ${ t TTTTTTTAGCCATCATTATATGTTTAAGTCTATTATGGGCAACCAATCTTTGGAAGCTGAAAACTGAATTTAAAG$ AATGCTATCTTGGAAAATTGCATACGTCTGTGCAATTTTTTATTCTGCCTAGTGCTATTCTGCTTGTTTAACTAG ATTGTACAAAATAACTTCATTGCTTAATATCAAATTACAAAGTTTAGACTTGGAGGGAAATGGGCTTTTTAGAAG ${\tt CAAACAATTTAAATATTTTGTTCTTCAAATAAATAGTGTTTAAACATTGAATGTGTTTTGTGAACAATATCC}$ ${\tt CACTTTGCAAACTTTAACTACACATGCTTGGAATTAAGTTTTAGCTGTTTTCATTGCTCAATAATAAAGCCTGAA}$

 ${\tt MKKVLLLITAILAVAVGFPVSQDQEREKRSISDSDELASGFFVFPYPYPFRPLPPIPFPRFPWFRRNFPIPIPES} \\ {\tt APTTPLPSEK}$

Signal sequence.

amino acids 1-17

 $\label{thm:constraint} $$ MRPQGPAASPQRLRGLLLLLLQLPAPSSASEIPKGKQKAQLRQREVVDLYNGMCLQGPAGVPGRDGSPGANVIP$$$ GTPGIPGRDGFKGEKGECLRESFEESWTPNYKQCSWSSLNYGIDLGKIAECTFTKMRSNSALRVLFSGSLRLKCR NACCQRWYFTFNGAECSGPLPIEAIIYLDQGSPEMNSTINIHRTSSVEGLCEGIGAGLVDVAIWVGTCSDYPKGD ASTGWNSVSRIIIEELPK$

Signal sequence.

amino acids 1-30

N-glycosylation site.

amino acids 186-189

N-myristoylation sites.

amino acids 67-72, 117-122, 163-168, 199-204, 203-208

MENPSPAAALGKALCALLLATLGAAGQPLGGESICSARAPAKYSITFTGKWSQTAFPKQYPLFRPPAQWSSLLGA
AHSSDYSMWRKNQYVSNGLRDFAERGEAWALMKEIEAAGEALQSVHEVFSAPAVPSGTGQTSAELEVQRRHSLVS
FVVRIVPSPDWFVGVDSLDLCDGDRWREQAALDLYPYDAGTDSGFTFSSPNFATIPQDTVTEITSSSPSHPANSF
YYPRLKALPPIARVTLLRLRQSPRAFIPPAPVLPSRDNEIVDSASVPETPLDCEVSLWSSWGLCGGHCGRLGTKS
RTRYVRVQPANNGSPCPELEEEAECVPDNCV

Signal sequence.

amino acids 1-26

Glycosaminoglycan attachment site.

amino acids 131-134

cAMP- and cGMP-dependent protein kinase phosphorylation site.

amino acids 144-147

N-myristoylation sites.

amino acids 26-31, 74-79, 132-137, 134-139, 190-195, 287-292, 290-295

MGVWLNKDDYIRDLKRIILCFLIVYMAILVGTDQDFYSLLGVSKTASSREIRQAFKKLALKLHPDKNPNNPNAHG
DFLKINRAYEVLKDEDLRKKYDKYGEKGLEDNQGGQYESWNYYRYDFGIYDDDPEIITLERREFDAAVNSGELWF
VNFYSPGCSHCHDLAPTWRDFAKEVDGLLRIGAVNCGDDRMLCRMKGVNSYPSLFIFRSGMAPVKYHGDRSKESL
VSFAMQHVRSTVTELWTGNFVNSIQTAFAAGIGWLITFCSKGGDCLTSQTRLRLSGMLFLNSLDAKEIYLEVIHN
LPDFELLSANTLEDRLAHHRWLLFFHFGKNENSNDPELKKLKTLLKNDHIQVGRFDCSSAPDICSNLYVFQPSLA
VFKGQGTKEYEIHHGKKILYDILAFAKESVNSHVTTLGPQNFPANDKEPWLVDFFAPWCPPCRALLPELRRASNL
LYGQLKFGTLDCTVHEGLCNMYNIQAYPTTVVFNQSNIHEYEGHHSAEQILEFIEDLMNPSVVSLTPTTFNELVT
QRKHNEVWMVDFYSPWCHPCQVLMPEWKRMARTLTGLINVGSIDCQQYHSFCAQENVQRYPEIRFFPPKSNKAYQ
YHSYNGWNRDAYSLRIWGLGFLPQVSTDLTPQTFSEKVLQGKNHWVIDFYAPWCGPCQNFAPEFELLARMIKGKV
KAGKVDCQAYAQTCQKAGIRAYPTVKFYFYERAKRNFQEEQINTRDAKAIAALISEKLETLRNQGKRNKDEL

Signal sequence.

amino acids 1-48

N-glycosylation site.

amino acids 484-487

cAMP- and cGMP-dependent protein kinase phosphorylation site.

amino acids 445-448

N-myristoylation sites.

amino acids 2-7, 41-46, 103-108, 110-115, 157-162, 182-187, 243-248, 458-463, 566-571

Amidation sites.

amino acids 389-392, 739-742

Endoplasmic reticulum targeting sequence.

amino acids 744-748

Cytochrome c family heme-binding site signature.

amino acids 158-163

Thioredoxin.

amino acids 128-234, 406-509, 511-592, 623-703

DnaJ domain.

amino acids 35-100

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FIGURE 10

 $\label{thm:constraint} $$ MAQQACPRAMAKNGLVICILVITLLLDQTTSHTSRLKARKHSKRRVRDKDGDLKTQIEKLWTEVNALKEIQALQT $$ VCLRGTKVHKKCYLASEGLKHFHEANEDCISKGGILVIPRNSDEINALQDYGKRSLPGVNDFWLGINDMVTEGKF $$ VDVNGIAISFLNWDRAQPNGGKRENCVLFSQSAQGKWSDEACRSSKRYICEFTIPK $$ $$ VDVNGIAISFLNWDRAQPNGGKRSDAQFTIPK $$ VDVNGIAISFLNWDRAQPNGGKRSDAQFTIPK $$ VDVNGIAISFLNWDRAQPNGGKRSDAQFTIPK $$ VDVNGIAISFLNWDRAQPNGGKRSDAQFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$ VDVNGIAISFLNWDRAQPNGAGFTIPK $$$

Signal peptide.

amino acids 1-31

N-myristoylation sites.

amino acids 14-20, 155-161

Amidation sites.

amino acids 126-130, 170-174

C-type lectin domain signature.

amino acids 176-201